EUPLOEA BUTTERFLIES OF THE REMOTE SANTA CRUZ ISLANDS (TEMOTU PROVINCE, SOLOMON ISLANDS): NAMES, PHENOTYPES AND DISTRIBUTION (LEPIDOPTERA: NYMPHALIDAE: DANAINAE)

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Abstract

Based on recently collected material from the Santa Cruz Islands (Temotu Province, Solomon Islands), distribution of subspecies of *Euploea sylvester* Fabricius, *E. leucostictos* Gmelin, *E. boisduvalii* Lucas, *E. treitschkei* Boisduval and *E. lewinii* Felder & Felder in the islands is discussed. The names *era* de Nicéville, 1902 and *matemae* Carpenter, 1953 are newly synonymised with *E. boisduvalii lapeyrousei* Boisduval, 1832. The name *brunnescens* Carpenter, 1953 is newly synonymised with *E. lewinii lilybaea* Fruhstorfer, 1911.

Introduction

The danaine genus *Euploea* Fabricius is very diverse in the large islands of the Solomon archipelago in the tropical southwest Pacific. Some islands (*e.g.* San Cristobal, Malaita, Rennell) support remarkable mimetic butterfly assemblages, involving *Euploea*, *Danaus* Kluk (Danainae) and *Hypolimnas* Hübner (Nymphalinae), with quite different phenotypes of the same species occurring on adjacent islands. Fewer taxa have penetrated as far as the smaller islands of Micronesia and Polynesia further east. Mimetic associations and distribution of Pacific danaines were examined by Poulton (1924, 1926), Carpenter (1942, 1953), Ackery and Vane-Wright (1984) and Dudley and Adler (1996).

This paper deals with the nomenclature and distribution of *Euploea* species and subspecies in the remote Santa Cruz group of islands, politically part of the Solomon Islands, but geographically closer to the New Hebrides archipelago (Vanuatu), in preparation for a forthcoming book on the butterflies of the Solomon Islands. It also deals with the nomenclature of the islands themselves (Fig. 1). In a comprehensive taxonomic and biogeographical study, Carpenter (1953) was concerned largely with the distribution of *Euploea* forms and subspecies in the Pacific. Recently collected material has enabled resolution of some apparent anomalies.

The main island of the Santa Cruz group appears in the Times Atlas of the World as 'Ndeni' and this has often been used in the literature, including by the present author (Tennent 1999, 2000, 2001). The name is not recognised by local people, who call the island 'Santa Cruz' or 'Nendo'. The small islands of Trevanion and Lord Howe lie a few hundred metres off the northwest and southeast coasts of Nendo respectively. To the north of Nendo lies the active volcano of Tinakula and northeast of Tinakula are the scattered islands of the Reef and Duff groups. Utupua and Vanikoro lie southeast of

Nendo and the latter is only some 160 km north of the most northerly islands of the Torres group (Vanuatu). An alternative name for the Reefs is 'Swallow' or 'the Swallows', which also appears in the Times Atlas and has been used by authors including Carpenter (1953) and Ackery and Vane-Wright (1984). Like Ndeni, the name is not recognised locally. The Reef group includes the small western outliers of Matema and Pileni and should not be confused with the Reef Islands which form part of the Banks island group of northern Vanuatu, some 400 kilometres to the southeast. Still further east lie the tiny and remote Polynesian islands of Tikopia, Anuta and Fatutaka. Anuta and Fatutaka are referred to as 'Cherry' and 'Mitre' by the Times Atlas. There are no butterfly records from uninhabited Fatutaka.

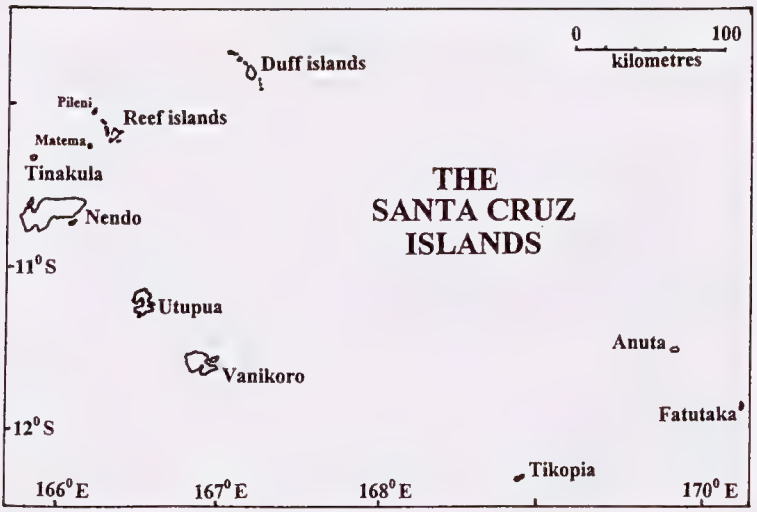

Fig. 1. Map of the Santa Cruz Islands.

A previous lack of material (Carpenter 1953) has in some cases hampered assignation of *Euploea* populations to subspecies. The author spent several months in the Santa Cruz group in 2000 and made collections of *Euploea* butterflies on all islands visited. Collections were also made on some northern islands of Vanuatu, including the Torres group, from where few specimens have also previously been available. This combined material has made it possible to reassess distribution of some Santa Cruz phenotypes. Collection of *Euploea* (and *Danaus affinis* Fabricius) specimens is considerably assisted throughout the tropical Pacific by the attraction of males (and occasionally females) to the withered leaves and twigs of plants, including *Argusia argentea* (Boraginaceae), from which they sequester chemical compounds for use in defence against predators.

Several hundred specimens have been deposited in The Natural History Museum (BMNH), London. The following abbreviation has been used: TL - Type locality.

The Santa Cruz group *Euploea* species

***Euploea sylvester* Fabricius, 1793** (TL: [Australia])

In a consolidated list (Carpenter 1953) of Pacific *Euploea* distribution, *melander* Grose-Smith, 1897 (TL: 'Santa Cruz') and *tristis* Butler, 1866 (TL: Vanuatu) were regarded as geographical subspecies, whilst *moesta* Butler, 1866 (TL: Irian Jaya) was noted as a 'form'. Carpenter (1953) said of *moesta* 'under this name are included the poorly spotted forms ...' and went on to separate *melander*, *tristis* and other forms, including *moesta*, on the basis of geographical distribution, in effect applying all of these names at the level of subspecies. Carpenter reported two male *moesta* from Matema, several *melander* from Santa Cruz [Nendo], Utupua, Vanikoro and the Reefs (Banks group) and *tristis* from many islands of Vanuatu, including the Banks and Torres groups. He reported a solitary male *tristis* from Matema, which he regarded as an 'unusual locality' for this subspecies. Samson (1979) regarded Santa Cruz *sylvester* as *melina* Godart, 1819 (TL: Moluccas).

Carpenter (1953) said 'It might seem legitimate to claim that as *tristis* ... *moesta* [and] *melander* ... seem closely connected by intermediates it would be justifiable to treat all as synonyms of *tristis*. Yet the geographical distribution supports continuance of these names'. Collection of further material confirms an apparent line of demarcation between the Santa Cruz group and, for example, the Torres group. In a series of 37 males and 5 females collected by the present author from Nendo, the Reefs (Ngadeli, Nifololi, Lomlom, Pileni), Utupua and Vanikoro, only 6 males (Nendo, Reefs [Ngadeli, Lomlom]) have prominent white submarginal spots on the upperside of the hindwing and white subapical markings on the upperside of the forewing, whilst the remainder have an unmarked hindwing (or almost so) and blue subapical spots on the forewing. By comparison, males from a series of 6 males and 14 females from the Torres group have prominent white subapical and submarginal markings. Females are more variable and may be difficult to separate.

In the opinion of the present author, populations of all Santa Cruz Islands from which material is available are referable to *E. s. melander*, whilst populations from the Torres group to the south are *E. s. tristis*. The species has not been reported from Tikopia, Anuta or the Duff group.

***Euploea leucostictos* Gmelin, 1790** (TL: [Ambon])

E. leucostictos crucis Carpenter, 1953 was described from three males and one female from Santa Cruz [Nendo] and a 'small' male specimen of *polymela* Godman & Salvin, 1888 (TL: Solomon archipelago [syntypic series]), the usual form from the Solomon archipelago further west, was also

noted from Santa Cruz. Carpenter (1953) said of this specimen 'The specimen from Santa Cruz ... is of particular interest, seeing that another form of [*leucostictos*] occurs there: possibly this one was an intruder'. Carpenter went on to describe *eustachiella* Carpenter, 1953 from a male and two females from Anuta and to report (Carpenter 1953) five male *iphianassa* Butler, 1866 (TL: Vanuatu: Aneityum) and a male *novarumebudum* Carpenter, 1942 (TL: Vanuatu: Espiritu Santo) from Tikopia among long series of both subspecies from the islands of Vanuatu.

Examination of a long series of *E. leucostictos* from Nendo, the Reefs (Matama, Ngadeli, Lomlom, Pileni, Temotuana'a Atoll), the Duffs, Utupua and Vanikoro, suggests that *E. l. crucis* is a variable insect. Many males lack subapical markings, whilst others have a curved series of white subapical spots. Females are more variable, but few have the prominent hindwing submarginal spots characteristic of *E. l. iphianassa*. By comparison, a series of 23 males and 8 females from Tikopia are significantly less variable. Males are large and dark in appearance and both sexes are indistinguishable from *E. l. iphianassa* from the Torres group. Thus, it is clear that *E. l. crucis* occurs on all western islands of the Santa Cruz group, whilst *E. l. iphianassa* occurs on Tikopia, as well as on the Torres group in northern Vanuatu. The author was unfortunately only able to spend one day on Anuta, in dull weather. *E. leucostictos* was not seen and no comment is made regarding the status of *E. l. eustachiella*, beyond noting that Carpenter (1953) agreed that some specimens of *eustachiella*, *eustachius* Kirby, 1899 (New Guinea) and *iphianassa*, differed little.

***Euploea boisduvalii* Lucas, 1853** (TL: 'Australia' [?Fiji])

In addition to *era* de Nicéville, 1902 (TL: 'Santa Cruz' [?Nendo]) from Nendo and Reef Island (Banks group), Carpenter (1953) reported *lapeyrousei* Boisduval, 1832 (TL: Vanikoro) from Vanikoro and Utupua, and *matemae* Carpenter, 1953 (TL: Matema) from Matema and Anuta. It is noted that *bakeri* Poulton, 1927 (TL: Vanuatu: Espiritu Santo) was reported from the Banks group, in addition to seven males from the Reefs. *E. b. era* was reported from Tikopia by Ackery and Vane-Wright (1984).

Carpenter (1953) compared *era* with *torvina* Butler, 1875 (TL: Vanuatu: Aneityum) from the southern islands of Vanuatu. He considered phenotypic differences between *era*, *lapeyrousei* and *matemae* warranted separation at subspecies rank and figured both sexes of each of the last two taxa. Differences between these monochrome illustrations are certainly apparent, with *matemae* displaying much paler wing margins (especially the female) than *lapeyrousei*.

The author collected a series of 47 male and 39 female *E. boisduvalii* from Nendo, Tinakula, the Reefs (Matama, Ngadeli, Nifiloli, Lomlom, Pigeon), the Duffs (from where *boisduvalii* was previously unreported), Utupua, Vanikoro

and Tikopia. This material included 2 males and 1 female from Matema (TL of *matemae*) and 5 males and 16 females from Vanikoro (TL of *lapeyrousei*). It is not possible to separate specimens from any of these localities and in the opinion of the author, populations from all islands of the Santa Cruz group are the same. The question of which name should properly be applied was, in effect, determined by Carpenter (1953) who resolved 'a most complicated tangle of mistakes' concerning the type material and type locality of *lapeyrousei*. There seems no doubt that *lapeyrousei* originated from Vanikoro (appropriately, since it was here that Jean-François de Galaup de La Pérouse met an untimely end in 1788) and the names *era* and *matemae* are here placed as new synonyms of *E. b. lapeyrousei*. It is noted that the islands of Matema and Anuta are more than 400 km distant from each other and it is considered highly unlikely that a distinct geographical subspecies (*i.e. matemae*) occurs on these two tiny islands but not on intervening islands.

***Euploea treitschkei* Boisduval, 1832** (TL: New Ireland)

Carpenter (1953) reported three female *viridis* Butler, 1882 (TL: 'Thursday Island, south of New Guinea' [Torres Strait, Queensland]) 'which can only be classed as transitional to *jessica*' from Vanikoro and one male *aenea* Butler, 1872 (TL: 'Solomon Islands') from Utupua but recorded *jessica* Butler, 1869 (TL: 'Fiji' [almost certainly erroneous]) with a wide geographical range from the Bismarck and Solomon archipelagos to New Caledonia and Vanuatu. He did not record *jessica* from the Santa Cruz group. Samson (1979) reported *E. treitschkei aenea* and *E. treitschkei* f. *jessica* from the Santa Cruz group and Ackery and Vane-Wright (1984) recorded Santa Cruz *treitschkei* as '*Euploea treitschkei* ssp.'.

Carpenter (1953) said 'The variable forms grouped under the specific name *treitschkei* have proved to be extremely troublesome to sort out ...'. Collection of material is also rather more 'troublesome' in the case of *E. treitschkei* than its congeners since males seem rarely to be attracted to the leaves and twigs of *Argusia* trees, but prefer (unidentified) climbing vines (presumably with similar chemical properties to those of *Argusia*). Such vines are usually several metres above ground. Individual butterflies were not observed congregating in the manner of other *Euploea* species in the Santa Cruz Islands.

Despite potential confusion in allocating names geographically suggested by Carpenter (1953), material collected by the author (15 males and 4 females) on Nendo, Utupua and Vanikoro, appear referable to the name *jessica*. There is some variation in males; some have the hindwing unmarked, whilst others have one or more postdiscal white marks, never approaching the large and prominent series of *lorenzo* Butler, 1870 (TL: 'Solomon Islands' [?San Cristobal]) from San Cristobal, the easternmost island of the Solomon archipelago and from certain other islands including the Torres group.

In using the names *jessica* and *lorenzo* above, use of the prefix 'form' or 'subspecies' has been avoided. Although authors disagree on the status of these names, many consider them to be merely widespread forms and there is some evidence to support this. However, in the Solomon archipelago (especially on San Cristobal and in the Santa Cruz group) phenotypes appear geographically more or less constant. *E. treitschkei* would benefit from a thorough revision. It is noted that Carpenter (1953) considered *lorenzo* a synonym of *jessica*.

***Euploea lewinii* Felder & Felder, [1865]** (TL: [Tonga])

E. lewinii brunnescens Carpenter, 1953 was described from 12 males and a female from Tikopia and one male from Vanikoro. It was said to be similar in appearance to *lilybaea* Fruhstorfer, 1911 (TL: Vanuatu: Tanna). Carpenter (1953) also recorded two males in the California Academy of Sciences Collection, said to be from Anuta, which were 'not like [*brunnescens*] from Tikopia and Vanikoro, but agree better with Fijian *eschscholtzii* [Felder & Felder, [1865] (TL: Fiji)]'.

In his description of *brunnescens* Carpenter (1953) said '... differs from all other forms of *lewinii* by its light brown colour on the upper side ... the underside is even paler, thus differing from *lilybaea* which [it] most resembles ...'. It is curious that *E. lewinii* was not seen by the author during 8 weeks spent on the island of Tikopia, the TL of *E. l. brunnescens*. This is a small island (it is possible to walk around it in little more than half a day at low tide). Conversely, it was the only danaine seen on a whole day spent on the island of Anuta, where a short series of 11 specimens was collected. Comparison of this series from Anuta, paratypes of *brunnescens* in the BMNH and material from various islands of Vanuatu does not support perceived differences. Indeed, some specimens from, for example, Espiritu Santo and Malekula, have paler undersides than those from Tikopia or Anuta. Other minor characteristics provided by Carpenter appear not to be geographically consistent and *brunnescens* is here placed as a new synonym of *E. lewinii lilybaea* to which, in the opinion of the author, Tikopia and Anuta specimens properly belong. Occurrence of *E. lewinii* on Vanikoro requires confirmation.

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